THERMAL, IR, CATION EXCHANGE AND ADSORPTION STUDIES OF NEW SYNTHETIC ZEOLITE (DEOLITE)

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(Received January 18, 1994; in revised form May 20, 1994)

Abstract

Cadmium(II) and Pb(II) ions replace the sodium(I) ion in commercial molecular sieve deolite. These exchanged derivatives have been interacted with adsorbates like CO₂ and NH₃ and the new exchanged and adsorbed derivatives characterized by their TG and IR spectral data. It is concluded that deolite can be effectively employed for removal of hazardous Cd(II) and Pb(II) ions as well as the gaseous adsorbates.

Keywords: Deolite, IR, TG, zeolite

Introduction

Commercial deolite, a desicant having similar properties to 4A type zeolite has already been thermally and structurally studied by authors [1-3]. In the present case of investigation deolite has been interacted with Cd(II) and Pb(II) ions. These exchanged derivatives have been used for adsorbing CO₂ and NH₃. The aim of the present study is to test their stabilities as cation exchangers. Cadmium and lead are known air and water pollutants having toxic effect on the pulmonary and renal systems [4]. Similarly, carbon dioxide and ammonia have hazardous effects which necessitates their removal from both water and the atmosphere for health safety [5]. The new exchanged and adsorbed derivatives have been characterized by their TG and IR analysis and results have been reported here.

Experimental

The deolite sample was obtained from Ras Enterprises, Bombay as a white odourless powder and procedure used for the preparation of exchanged and ad-
sorbed derivatives has been described earlier [6]. An aqueous solution of Analar cadmium(II) nitrate-tetrahydrate and lead(II) chloride were used for exchange. Composition study has been carried out by Simadzu simultaneous X-ray fluorescence spectrophotometer. TG analysis was performed by Perkin Elmer thermobalance at the heating rate of 15 deg/min in air. IR spectra were obtained by Perkin Elmer 397 spectrophotometer using KBr phase in the range of 4000–400 cm⁻¹. Alkali metals were estimated by Elico digital flame photometer.

**Results and discussion**

The analytical data of deolite and its derivatives are given in Table 1. On the basis of obtained analytical data it has been suggested that deolite is a fairly good ion exchanger for these ions. The mechanism of cation exchange and ad-

![TG Plots](image-url)

**Fig. 1**